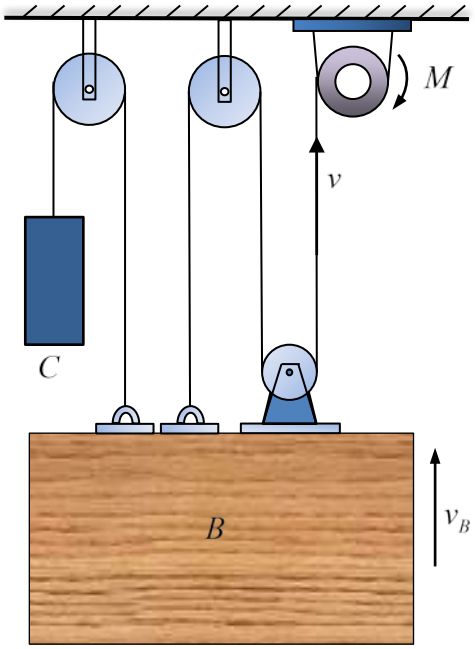
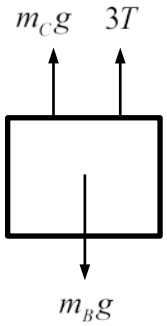
2-32. A block is lifted with a constant velocity $v_B = 1\,\text{m/s}$ by the motor *M*. The masses of blocks *B* and *C* are $m_B \sim N(1000, 10^2)\,\text{kg}$ and $m_C \sim N(200, 2^2)\,\text{kg}$, respectively. If the motor has an efficiency of $e = 0.75$, determine the power supplied by the motor. Assume m_B and m_C are independent.





$$(+\uparrow)\ \Sigma F_y = ma;\ 3T + m_C g - m_B g = 0$$

$$T = \frac{m_B g - m_C g}{3}$$

$$v = 3v_B$$

$$P = \frac{Fv}{e} = \left(\frac{m_B g - m_C g}{3}\right)(3v_B)\left(\frac{1}{0.75}\right) = \frac{(m_B - m_C)v_B g}{0.75}$$

$$\mu_P = \frac{(\mu_{m_B} - \mu_{m_C})v_B g}{0.75} = \frac{(1000 - 200)(1)(9.81)}{0.75} = 10.46 \text{ kW}$$

$$\sigma_P = \frac{v_B g}{0.75}\sqrt{\sigma_{m_B}^2 + \left(\sigma_{m_C}\right)^2} = \frac{(1)(9.81)}{0.75}\sqrt{(10)^2 + (2)^2} = 0.13 \text{ kW}$$

Therefore, $P \sim N(10.46, 0.13^2)$ kW. **Ans.**